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Notes on the Collared Petrel *Pterodroma (leucoptera) brevipes*

by Dick Watling

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The Collared Petrel *Pterodroma (leucoptera) brevipes* has been very little studied. Limited mensural data are available (Bourne 1983, Clunie 1976, Loomis 1918, Murphy 1929). Bourne (1981) summarises some of the museum specimens, whilst a summary of all fragmentary records in the literature, including some new records, is to be published (Jenkins in prep.). Information on the biology of the Collared Petrel is needed to help elucidate its taxonomic position within the complex *P. leucoptera* group.

Recent fieldwork on Gau I., Fiji (18°00'S, 179°16'E – see Watling 1985) has enabled additional information to be collected. The voice has been taped and a large live sample examined to record plumage details of this 'polymorphic' species. Twenty-one Collared Petrels were collected and have been deposited as whole specimens at the Fiji Museum. The only other major collections are skins at the American Museum of Natural History (AMNH) – 20 adults and young taken at the nest on Kadavu by the Whitney South Sea Expedition; 6 adults with 2 chicks in the Cambridge University Museum of Zoology (CUMZ), taken from central Vitilevu; 8 specimens at the British Museum (Natural History) (BMNH), 4 from Aneityum, Vanuatu and 4 from Vitilevu. Other minor collections are held at the Australian Museum, 3 specimens from Vitilevu and one unlabelled (W. Boles); 2 specimens at the Liverpool Museum, one from Vitilevu and one from Vanuabalavu ('Lomaloma'), Fiji; 4 specimens at Leiden and one at Paris (W. R. P. Bourne).

Three of Fiji's pioneering ethnographer-zoologists wrote at varying lengths about the Collared Petrel in Fiji in the 1860–70's: Baron Anatole von Hügel (Roth & Hooper in press), Theodore Kleinschmidt (1879) and Eduard Graeffe (1868). It is clear from their accounts that the Collared Petrel was well known and extensively exploited in certain areas. That petrels were once well known, in many communities, is confirmed by the presence of traditional songs/poems/lullabies which either mention or whose subject is exclusively the Rikoriko, Lagio or Kacau, 3 Fijian names for petrels (Watling in prep.). Whilst these poems etc. are still orally perpetuated in some communities, there appears to be no knowledge of nesting petrels except in Kadavu, where they are

still exploited in a systematic manner (Watling in prep.). On Vitilevu and Vanualevu, it is doubtful if Collared Petrels still breed because of the depredations of the Mongoose *Herpestes auro punctatus*, introduced in 1873 (but see below), which explains the lack of contemporary knowledge of petrels.

Apart from Fiji, the Collared Petrel is known to breed in Vanuatu (Murphy 1929) and the Cook Islands, where a fledgling was taken on Rarotonga in September 1984 (the skin is deposited at the National Museum, Wellington). Although it is thought to breed in Western Samoa there are no breeding records, whilst in American Samoa, Amerson *et al.* (1982) tentatively record it breeding in Ta'u. Jenkins (1980) records the Collared Petrel at sea in Tongan waters, while Bourne (1974, 1981) indicates the possible presence of a larger form from the Solomons.

TABLE 1
Measurements of Collared Petrels *Pterodroma (leucoptera) brevipes*

	N	Wt.g	Wing	Tail	Tarsus	Middle Toe	Exposed Culmen
Gau m.	8	129	214	103	26.1	35.3	25.5
(range)		116-145	207-219	95-104	24.5-27	32.3-38.5	24.7-26.5
f.	12	140	212	102	26.1	35.0	24.4
(range)		126-158	205-220	98-105	24.1-26.9	33-37	22.8-25.6
imm. ¹	1		188	96	26	35	25
Clunie			212	97	26.9		24.3
(1976 ²)		(range)	201-222		24.1-30.6		22.1-26.9
		(n)	16	2	30		28
Murphy	13		218	95	26.5	34	24.3
(1929 ³)		(range)	207-226	91-99	26-28	32-35	22-26
Bourne	33		216	98	26.9	32.9	23.6
(1983 ⁴)							

Notes: 1. 'Fledgling', flew from the nest when disturbed; 2. Killed by Peregrine Falcon; 3. May include Vanuatu specimens; 4. Includes some but not distinguishable, AMNH specimens measured by Murphy (1929).

Measurements and Plumage colour

Details are given in Tables 1 & 2. The colour of the underparts of Collared Petrels vary from pure white with no more than dark nuchal patches to an even, dark grey, which is a diagnostic character of *brevipes* (Murphy 1929). Every intergradation between the 2 forms can be found (Plate 1). Although the sample is small (20 collected from Gau + suitably labelled museum skins), analysis by sex and age (breeding *versus* non-breeders) does not determine the degree of melanism. It is possible that separate breeding populations of the

TABLE 2
Ventral plumage colour of Collared Petrels *Pterodroma (leucoptera) brevipes*

Description	Gau		Kadavu		Vanuatu		Vitilevu	
	n	%	n	%	n	%	n	%
1. Pure White	52	37	13	100	1	8	1	8
2. Grey peppering	24	17	—	—	2	17	5	42
3. Smoky	40	29	—	—	3	25	4	33
4. Dark Grey	24	17	—	—	6	50	2	17
Sample sizes	140		13		12		11	

Notes: The Gau birds were examined live. Kadavu - Whitney specimens at AMNH. Vitilevu - von Hugel specimens at CUMZ + 2 Kleinschmidt specimens at AMNH + Australian Mus. specimens. Vanuatu - Whitney specimens at AMNH and BMNH specimens.

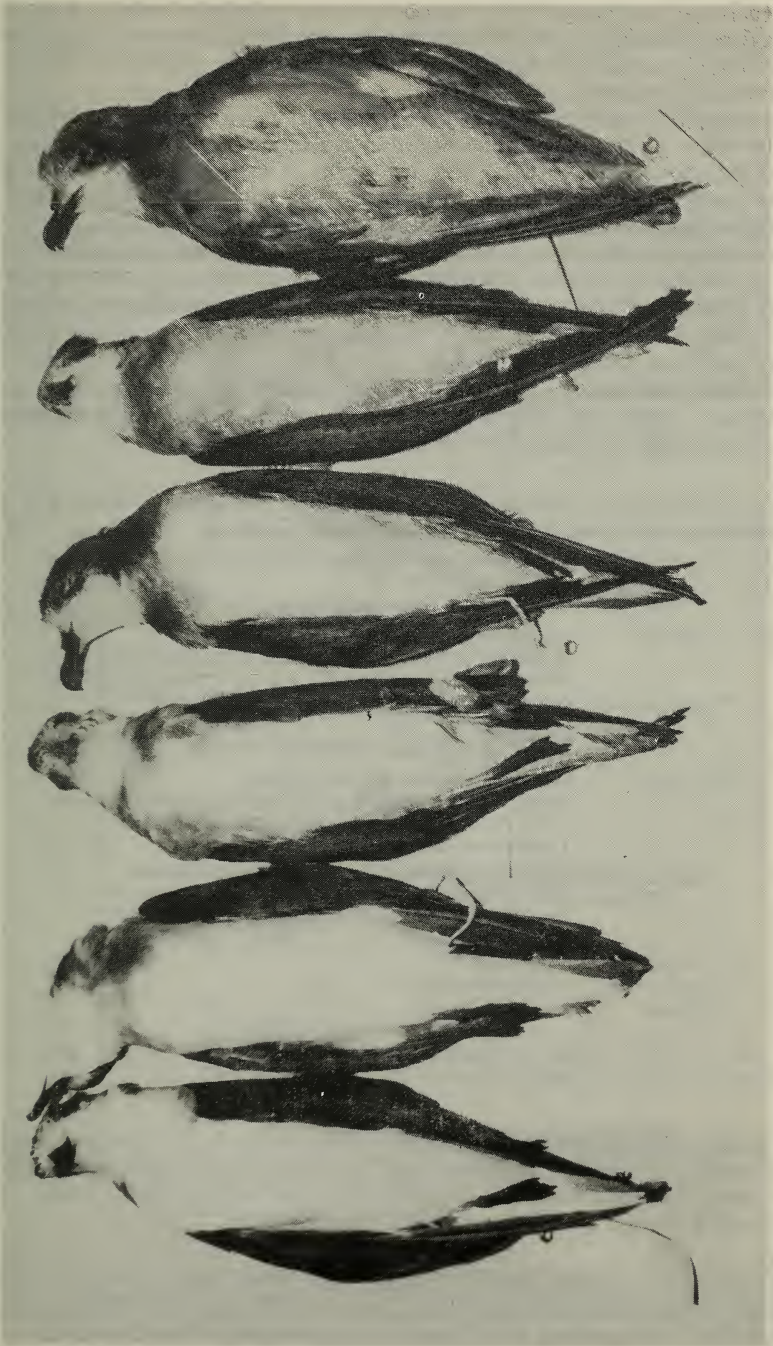


Plate 1. Collared Petrels *Pterodroma (leucoptera) brevipes* from Gau, Fiji showing range of ventral plumage variation. From left to right, categories (as in Table 2): 1; 1 (with dark collar); 2; 2; 3; 4.

Collared Petrel may have different proportions of melanistic birds. All those collected on Kadavu by the Whitney South Sea Expedition are "white or nearly white-breasted" birds (Murphy 1929), whilst the Vanuatu skins are predominantly melanistic.

The underwing patterns of all phases are the same, but strongly melanistic birds have the white wing bar showing grey traces and the dark leading edge appears to extend further back. The upperparts of melanistic birds are only slightly darker than white phase individuals. The dark dorsal 'M', a flight identification character, is present on both.

An unbroken dark collar is only found in melanistic birds (categories 3-4, Table 2) and rarely in other individuals. It is not a conspicuous character for identification at sea (pers. obs.), and consequently the common name Collared is misleading.

Tarsus and foot colour

The tarsus and foot of Collared Petrels are bicoloured, with the pale areas varying from a very light grey to an intense blue. The distal parts of the feet, toes and webbing, are black.

Food

Material from the proventriculus and gizzard of the collected birds and 2 regurgitations were identified by Dr Mike Imber (Table 3).

TABLE 3

Food of the Collared Petrel *Pterodroma (leucoptera) brevipes*

<i>Regurgitants</i>	Sample 1	Fish backbone (possibly Myctophid). Cephalopods: 2 large, unequal sized eyeballs (possibly <i>Histioteuthis</i> sp.) and remains of c. 3 juv. Ommastrephidae.
	Sample 2	Cephalopods: 2 juv. Ommastrephidae.

Summary of all proventriculus and gizzard contents.

Cephalopods	Many unidentifiable fragmented beaks 13 juv. Ommastrephidae (possibly <i>Sthenoteuthis oualaniensis</i>) 1 juv. Ommastrephidae (possibly <i>Eucleoteuthis</i> sp.) 1 <i>Histioteuthis</i> (?) 1 Pelagic octopus
Fish	2 Myctophidae – <i>Diaphus</i> sp. or <i>Lobianchia</i> sp. 6+ Myctophidae spp. unidentifiable – worn otoliths 1 Scombrophidae
Plastic	3 fragments 1 feedstock bead
Pumice	a few fragments

Notes: No Crustacea or Insecta (*Halobates*) were found in the samples. All prey was bioluminescent, except the pelagic octopus and the *Scombrops* sp. fish.

Lice

12 lice from the Collared Petrels were identified by Dr R. L. Palma as 6 male and 6 female *Halipeurus (Halipeurus)* sp. In contrast 4 lice taken from a Fiji Petrel *Pseudobulweria macgillivrayi* at the same time and place were 1 male, 2 female and 1 nymph of *Saemundssonina (Puffinoecus)* sp.

Voice

Recordings of Collared Petrels in flight were made with a Sony TC-D5 Recorder and a JVC M510 Super-directional microphone and analysed on a 6061-B Kay Sona-graph at the University of Canterbury, New Zealand.

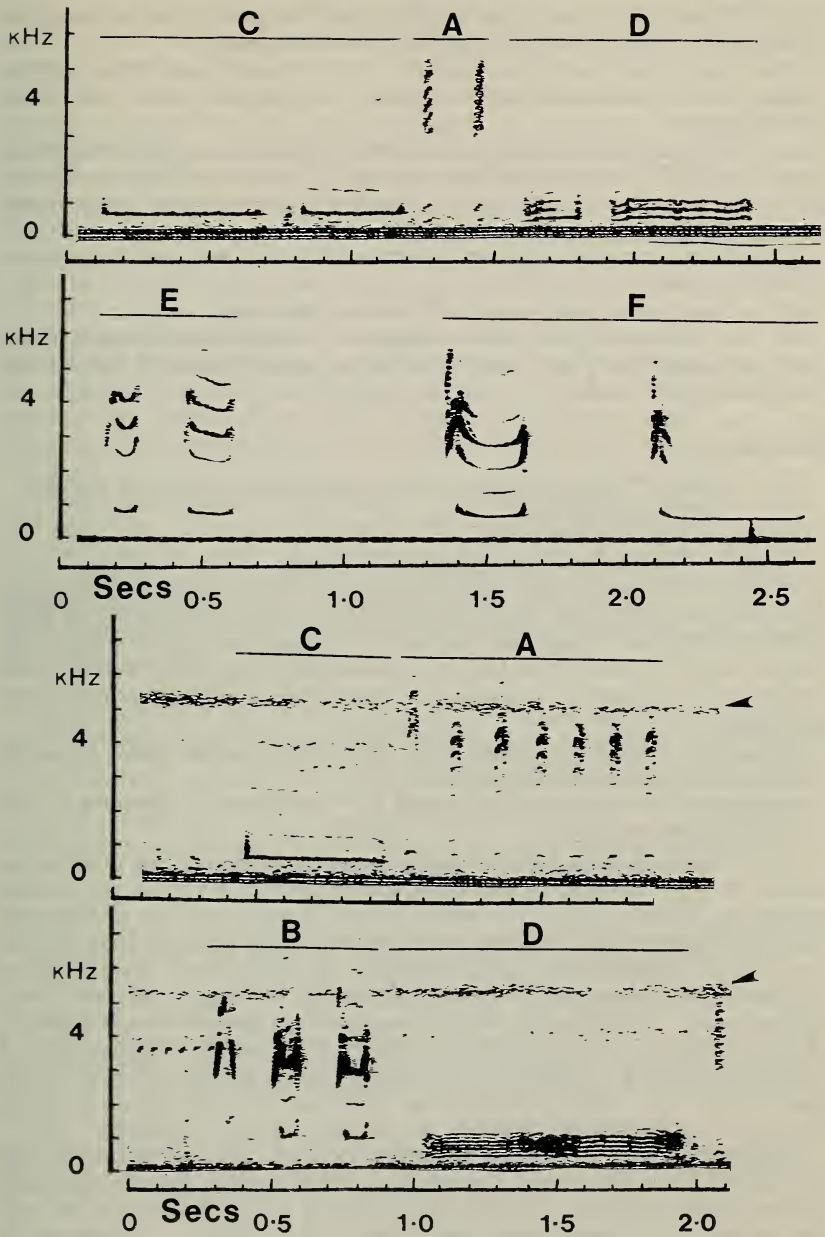


Figure 1. Calls of the Collared Petrel *Pterodroma (leucoptera) brevipes* in flight. A – the staccato *ti-ti-ti*; B – more complex *ti*'s or *gweks*; C – the low moaning *guorr*; D – thick, low purring call; E – the *cher-cher*; F – the more extended *cherr-chewee*. (Arrows indicate insect noise; the very low frequency noise in the sonographs – almost solid basal bar – is generated within the recorder.)

No Collared Petrels were heard calling from the ground, but no nocturnal observations of nesting birds at their burrows were made.

Four distinct calls were identified (Fig. 1). In many respects the calls are similar to some of those used by *P. hypoleuca*, *P. nigripennis* and *P. inexpectata* (J. Warham).

(1) Most commonly heard was a staccato "ti-ti-ti-ti", usually consisting of about 6 syllables, but occasionally extending to 12 or more. These notes had a high pitch and were far carrying. A derivative of this call was a more intense and rapid chattering.

(2) A low moan or "guorr", sometimes given by itself but often in association with "ti-ti...".

(3) A thick, low purring call with distinct harmonics.

(4) A "cher, cher" or "cherr, chewee...", the latter seeming to result from sustaining the "cher" note of the former and all apparently based on the "ti" and "gorr" calls.

Breeding

The Collared Petrel has been recorded ashore on the following islands:

Gau – presently breeding.

Kadavu – presently breeding.

Ovalau – (Ramsay 1882) probably still breeding.

Vitilevu – doubtfully still breeding because of the introduced mongoose.

However, on a wet, misty day in May 1971, F. Clunie found a freshly killed Collared Petrel on a Peregrine Falcon's *Falco peregrinus* eyrie several kilometres inland. In view of von Hugel's observations of day-flying Petrels inland (see below), it is possible that there are Collared Petrels still attempting to breed on Vitilevu.

Vanualevu – doubtfully breeds today, because of the mongoose, but as on Vitilevu, may still attempt to breed.

Vanuabalavu – collected by Layard at "Lomaloma"; specimen in the Liverpool Museum, UK.

It is probable that the Collared Petrel breeds on several, if not many, other islands in Fiji; Taveuni, in particular, could support a very large breeding population. They have been recorded at sea in Fiji waters in every month of the year, and Bourne (1981) indicated that Collared Petrels probably bred there the year round. However the only specimens or unequivocal descriptions of Collared Petrel young in the nest are from May to August (Graeffe 1868; Kleinschmidt 1879; Murphy 1929; Ramsay 1882; Roth & Hooper in press). A fledgling about to leave the nest was collected on Gau on 3 August 1983. A "fully grown chick" caught by a Peregrine Falcon in February (Bourne 1974) had a short wing length (210 mm) but otherwise adult dimensions, and may have been a moulting immature or non-breeder (W. R. P. Bourne).

Whether Collared Petrels are sedentary (Bourne 1983) or migrants is not yet known. The alleged type locality of *P.(l.) brevipes* is near Peter Island, south of the Antarctic Circle, at 95°W 68°S (Murphy 1929), which together with the origin of a Collared Petrel from Wales (Salvin 1891), is questioned by Bourne (1967). These 2 questionable records apart, there are no confirmed sightings or specimens recorded away from the breeding area, though it is worth noting the possible sightings of Meeth & Meeth (1983) between 100°–130°W and 0°–10°S. In contrast *Pl. leucoptera* is thought to migrate to

the eastern tropical Pacific when not breeding (Imber & Jenkins 1981), and the *P. brevipes* recorded from there (Murphy 1936) were probably this species (Imber & Jenkins 1981).

On Gau about 20 nests in 3 localities have been found. These 'loose' colonies are consistent with the descriptions of nesting at Narokorokoyawa (Roth & Hooper in press) and on Mt Washington, Kadavu (Correia's Journal Vol. O deposited at the AMNH); but on Tanna, Vanuatu, the Whitney Expedition recorded nests as "solitary on wooded slopes above 333 m". On Gau the nests are at between 100 and 465 m on steep, well forested slopes. A clear canopy was associated with one of the localities, but not with the other 2, which were under closed canopy. The high, often cloud covered ridges of Gau (550-625 m) have been well searched for petrel nests, but none has been found, although their remains have been found there in feral cat scats. So it appears that Collared Petrels nest on steep slopes and generally on the lower ones. Similar sites were used at Narokorokoyawa (Roth & Hooper in press). However, the petrels make display flights over the top ridges, up to and including the summits on Gau (715 m) and on Kadavu (805 m) (Kleinschmidt 1879).

On Gau the Collared Petrels never come ashore during daylight, arriving well after dark. However, at Narokorokoyawa, in the centre of Viti Levu (40 km from the coast), von Hugel describes petrels flying on a wet, misty afternoon (Roth and Hooper in press) and a label on one of his specimens at the CUMZ indicates that it was knocked down in flight with a stick. It is clear from von Hugel's description that these birds had not been disturbed from nests but were flying normally in daylight.

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Notes on some birds of northeastern Brazil

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In the last 7 years we have accumulated records which extend the known distribution of a number of Brazilian birds. These observations are based on the field work performed by the Ornithological Section of Museu Nacional in the residual Atlantic Forests of Alagoas, Pernambuco and Paraíba, northeastern Brazil.

Teixeira & Gonzaga (1983 a, b, 1985) have stressed that the distribution of the avifauna of northeastern Brazilian forests is not homogeneous. It may be said to be formed of 2 groups, one in the highland forests (550 m) and the other in the coastal lowland forests. Preliminary data obtained indicate that the lowland forest avifauna is predominantly Amazonian in composition, whereas the highland forests avifauna differs considerably. The stratified distribution pattern is difficult to interpret, but it is probably related to Quaternary glacial phenomena. As mentioned by Ab'Saber (1977), the dry climate of the latter period (c. 18,000 years ago) restricted forest ranges in South America, and confined them especially to the highlands, and in northeastern Brazil this may explain the existence of a highland endemic avifauna which is more closely related to the species of Atlantic Forests south of the São Francisco River than with the avifauna of the adjacent lowland forests. This is very well marked by the discovery, in the highlands, of several bird species never previously reported north of the São Francisco River, and also by the recently described *Philydor novaesi*, *Terenura sicki* and *Myrmotherula unicolor snowi*, which seem to be vicariant with *Philydor atricapillus*, *Terenura maculata* and *Myrmotherula u. unicolor* from southeastern Brazil. Additionally, the penetration through the lowlands of the Amazonian species could be regarded as a more recent phenomenon of forest expansion (c. 8000 years ago), which connected coastal northeastern Brazil with the lower Amazonian drainage.

Specimens in the Museu Nacional ornithological collections are referred to by the initials MN plus the respective catalogue number. Additionally, we also mention specimens in small regional collections. The basic literature on northeastern Brazilian birds is: Berla (1946), Forbes (1881), Hellmayr (1929),